

**2002
KANSAS WATER QUALITY
ASSESSMENT
(305(b) REPORT)**



April 1, 2002

**Kansas Department of Health and Environment
Division of Environment
Bureau of Environmental Field Services
Suite #430
1000 SW Jackson
Topeka, Kansas 66612-1367**

PART I: EXECUTIVE SUMMARY/OVERVIEW

This report, the *2002 Kansas Water Quality Assessment*, also known as the 305(b) Report, is the biennial assessment of the state's surface water quality as required by 33 USC 466 *et seq.*, the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act. The guidance by U. S. Environmental Protection Agency (EPA) for the preparation of this report provided options for reporting. The Kansas Department of Health and Environment (KDHE) elected to provide the an electronic report accompanied by an abbreviated narrative report. The abbreviated narrative report contains only the information required by law that has **changed** from the last report (2000 Kansas Water Quality Assessment 305(b) Report), March 31, 2000) and a simple reference to that report.

The Kansas Department of Health and Environment assessed the water quality for the period of 1998 through 2001, of 19,827 miles of streams, all of which were considered monitored. This report represents an increased assessment of 1,591 miles from the 2000 305(b) Report. This increase in milage is due (1) to assessment of four years of monitoring data and (2) to the increase in both in the number of stream chemistry and biological monitoring sites. A total of 188,487 lake acres were assessed. Of these, 175,894 acres were monitored and the conditions of an additional 12,593 lake acres were evaluated using professional judgement.

An assessment of cumulative designated use stream mileage revealed that 67 % of the designated uses were fully or partially supported. Of the assessed streams, 24 % (in stream miles) supported all designated uses. Of the assessed lakes, 19 % of the total acres were fully supporting but threatened for at least one designated use and 77 % were impaired for one or more uses.

The *2002 Kansas Water Quality Assessment Report* includes four years of ambient stream chemistry data (1998 - 2001) and only acute aquatic life use support application. Fish consumption advisories and swimming beach closures were applied in lieu of published criteria for food procurement and primary contact recreation. These approaches are consistent with the 1997 US EPA guidance and reflect the manner in which most states have prepared past 305(b) reports. The assessments contained in this report are otherwise consistent with the application of the numeric and narrative 2001 Kansas surface water quality standards.

The major causes of nonsupport for streams, in order of prevalence, are sulfate, pathogen indicators (fecal coliform), organic enrichment, and chlorides. The major causes for lake impairments were sediments, turbidity, taste and odor, and nutrients/eutrophication.

Sources responsible for widespread pollutant loadings and beneficial use impairments of streams include agriculture (nonirrigated and irrigated crop production, and intensive animal feeding operations), natural sources, habitat modification, municipal point sources, and groundwater withdrawal. Major sources for lake impairment included agriculture and municipal point sources.

Of the assessed lake acreage in Kansas, 69% was stable over time, while slightly more than 12% appeared to be undergoing measurable eutrophication. Thirteen percent of total lake acres showed appreciable improvement in trophic state condition during this reporting cycle. Municipal point sources, natural sources, and agriculture were the primary contributing factors to lake eutrophication.

High nitrate concentrations accounted for about 85% of the documented exceedences of the federal drinking water maximum contaminant levels (MCLs) during 2000 through 2001 for the groundwater monitoring network. Other isolated concerns of groundwater contamination included the presence of volatile organic compounds, heavy metals, petroleum products and/or bacteria. The major sources of these contaminants included active industrial facilities, spills, leaking storage tanks, mineral extraction activities, and agricultural activities.

The imposition of more stringent permit limits and the resulting upgrades of municipal and industrial wastewater treatment facilities continue to result in notable improvements in surface water quality. As the number of point sources causing or contributing to significant water quality impairments continues to decline, future attention will necessarily shift to the remaining sources, primarily nonpoint sources. It is anticipated that watershed pollution control efforts, predicated on the development of Total Maximum Daily Loads (TMDLs) and on the allocation of allowable pollutant loadings among point, nonpoint, and natural sources, will play an increasingly important role in the abatement of surface water pollution and improvement in water quality in Kansas. By June 30, 2002 Kansas will have established TMDLs for waterbodies listed in the 1998 Kansas 303(d) List in nine of the twelve river basins.

PART II: BACKGROUND

Updated data are provided in the tables that follow. There are no significant changes since the 2000 (b) Report.

Table 1.	Kansas Atlas
Table 2.	Number of Active KWPC and NPDES Permits
Table 3.	Permit Compliance Record
Table 4.	Summary of Local Environmental Code Adoption Trough
Table 5.	KDHE Cooperative Funding for Construction of Municipal Wastewater Treatment Facility Upgrades and Expansions, 1996-97

Table 1. Kansas Atlas

TOPIC	VALUE
State population	2,694,641
State surface area in square miles	81,778
Number of major river basins	12
Total number of interior stream miles (EPA RF3/DLG)	134,338
Number of border stream miles	120
Number of perennial stream miles	23,731
Number of intermittent stream miles	110,225
Number of ditch and canal miles*	382
Number of lakes/reservoirs/ponds (publicly owned)	315
Acres of lakes/reservoirs/ponds (publicly owned)	188,487
Acres of public freshwater wetlands	35,607

* Not applicable after Sept.1, 2001, K.S.A. 82a-2001

Table 2. Number of Active KWPC and NPDES Permits*

NUMBER OF PERMITTED FACILITIES					
Municipal and Commercial		Industrial/Federal		Agricultural	
Total Municipal and Commercial KWPC (non-overflowing)	439	Total Industrial/Federal KWPC (non-overflowing)	110	Agricultural NPDES	455
Discharging Lagoons	319	Total Industrial (discharging)	324	Agricultural State	1,529
Mechanical Treatment Facilities	189	Pretreatment	52	Agricultural Certifications	1,522
Total	947		486		3,506

KWPC = Kansas Water Pollution Control

* as of January 1, 2002

NPDES = National Pollutant Discharge Elimination System

Table 3. Permit Compliance Record. "Absolute" Compliance* for WWTFs Excluding Non-Discharging Lagoons.

YEAR	TYPE OF FACILITY	
	MUNICIPAL & COMMERCIAL	INDUSTRIAL
1999	86%	91%
2000	84%	94%
TOTAL NUMBER	510	320

WWTF = Wastewater Treatment Facility

*Absolute compliance means that the facility reported all parameters required by the permit and met all permit limits for the monitoring period.

Nonpoint Source Pollution Control

Local Environmental Protection Program (LEPP) -- The LEPP, administered by Kansas Department of Health and Environment (KDHE) and funded by the Kansas Water Office (KWO) under the auspices of the State Water Plan, provides financial assistance to local governmental units to develop and implement a local environmental protection plan. The authorizing statute requires the local environmental protection plan to include a sanitary code and to provide plans to address subdivision water and wastewater, solid waste, hazardous waste, public water supply protection, and Non Point Source (NPS) pollution. Presently, 102 of 105 Kansas counties are participating in the program. Environmental code adoption has been a priority effort since the beginning of the program.

Source Water Assessment Program – The 1996 amendments to the Safe Drinking Water Act require each state to implement a source water assessment program or SWAP. The Kansas SWAP plan was approved by the Environmental Protection Agency (US EPA) in February 2001. KDHE is currently implementing this plan with the goal of completing all necessary source water assessments by June 2004.

Table 4. Summary of Local Environmental Code Adoption Through 2001

STATUS	NUMBER
Adopted and Being Administered	102
Approved for Adoption	0
Being Developed	0
No Action	3

Table 5. KDHE Cooperative Funding for Construction of Municipal Wastewater Treatment Facility Upgrades and Expansions. Monetary units given in millions of dollars.

FEDERAL FUNDING YEAR (FFY)	KWPCRF*		CDBG**		RD***	TOTAL****
	BASIC	LEVERAGED	FEDERAL	TOTAL	FEDERAL	
2000	29.604	96.586	6.324	6.460	6.291	138.941
2001	12.753	24.853	3.774	3.827	7.233	48.666
Total	42.357	121.439	10.098	10.287	13.524	187.607

* KWPCRF= Kansas Water Pollution Control Revolving Fund

** CDBG = Community Development Block Grant

*** RD = Rural Development

**** Total without KWPCRF and RD Funding match

PART III: SURFACE WATER ASSESSMENT

The KDHE maintains five primary water quality monitoring programs. These address (1) the chemical and physical properties of streams and rivers, (2) the biological properties of streams and rivers, with emphasis on aquatic and semiaquatic macroinvertebrate communities, (3) the physiochemical and biological properties of lakes and wetlands, (4) contaminant concentrations in the tissues of bottom-feeding fish, and (5) the physiochemical properties of groundwater.

There have been no significant changes in the monitoring programs from those described in the 2000 305(b) Report with the exception of establishment of additional monitoring sites. Appendix A lists the parameters which were analyzed for by the Kansas Department of Health and Environment, Division of Laboratories or by the Bureau of Environmental Field Services. The current Section 106 monitoring strategy has not changed since the last Report, and therefore, is not included here. The accompanying maps delineate the sampling sites used for this report.

- Figure 1. Stream Chemistry Monitoring Network
- Figure 2. Biological Monitoring Network
- Figure 3. Lakes and Wetland Monitoring Network
- Figure 4. Fish Tissue Monitoring Network
- Figure 5. Groundwater Monitoring Network

The assessments of streams and rivers were conducted in the same manner as the 2000 305(b) Report. However, the assignment of stream miles assessed by chemical and physical parameters was slightly altered and therefore, the protocol for assignment of the stream miles to a monitoring site is included:

In the spatial application of the physicochemical and microbiological data, the department applied several simplifying assumptions. The foremost assumption was that each network site effectively “monitored” all unimpounded upstream (RF2 and listed RF3) hydrologic database segments within a 30-kilometer radius and all downstream main stem segments within 15-kilometers. There were several exceptions to this rule:

- 1) If an upstream tributary segment extended outside the radius, the segment was considered monitored only if more than 50% of its length was within the radius.
- 2) If a (main stem) segment originated within the “assessment reach” of a network site, and a significant portion (10 – 20%) fell within the assessment reach, then the entire segment was regarded as monitored unless point sources or major tributary confluences outside the reach were expected to significantly influence water quality.
- 3) If a monitoring site occurred on a tributary within the assessment reach of a downstream (main stem) site, use support determinations for the tributary were based on data from the tributary site.
- 4) If the separation distance between sites was less than 45 kilometers, use support summaries for overlapping assessment reaches were based on data from the downstream monitoring site. Such overlapping reaches generally occurred on larger (main stem) streams.

- 5) Ditches, irrigation canals, major classified impoundments and their upstream segments were excluded from the assessment (except for Empire Lake due to a short hydrological residence time).
- 6) If a major (>1.0 MGD) sewage treatment plant discharged within the assessment area, the assessment began at the treatment plant outfall when the monitoring site was located below the point source, or ended at the treatment plant outfall if the monitoring site was above the point source (except for two cases where the wastewater discharge flow to receiving stream ratio was $\leq 1:400$ and the available empirical data did not indicate a change in water quality due to the effluent discharge).
- 7) If a major sewage treatment plant discharged into a stream and two network sites closely bracketed the outfall location, the outfall location served as the delineation point between upstream and downstream assessment reaches.
- 8) Staff used professional judgment to include or exclude segments within the assessment distance if these segments were largely intermittent or of much smaller stream order.

This report is based upon four years of stream chemistry data (1998 -2001) and only acute aquatic life use support application. The ambient stream chemistry sampling data consists of grab samples taken, for the most part, every two months and do not lend themselves to chronic assessments based on a 7-day or 30-day averaging periods. The determinant criteria applied were based upon the 2001 Kansas surface water quality standards and utilized the numeric criteria with the exception of total suspended solids (TSS). Kansas has a narrative criterion for TSS. This was not used in the overall assessment but a separate basin summary of TSS for the four year period is included in Appendix B.

In assigning a support category to a particular designated use, the department consistently considered the "worse case" water quality parameter. For example, if a stream segment (or part of a segment) complied during the reporting cycle with all but one of the criteria for the protection of the livestock watering use, the segment or partial segment was deemed either partially supportive or non-supportive of the use (depending on the severity of the pollution problem) and assigned to the "impaired" category for overall use support. Any parameter monitored on fewer than three occasions during the reporting cycle was excluded from this analysis. Similarly, monitoring sites monitored fewer than three times during the reporting cycle, such as sites episodically dry, were not considered in the 2002 305(b) assessment.

Where listed, RF2 or RF3 stream reaches were deemed either partially supportive or non-supportive of a use, the department considered the pollutants (causes) of concern and attempted to determine the most probable sources of these pollutants. Informational materials used in this analysis were derived both from with KDHE and from various other governmental agencies and institutions and included: (1) GIS coverage and related maps depicting prevailing land uses, crop type, grazing livestock densities, and the location of major urban areas, highways, major municipal and industrial point sources, and permitted and certified feedlot facilities; (2) other maps and related written materials addressing regional topography, geology, soil characteristics, and the location of major mineral intrusion areas, active and inactive oil and natural gas fields, surface and subsurface mines, permitted irrigation wells, and documented groundwater and /or soil contamination sites; and (3) miscellaneous reports and publications

regarding stream flow, stream channelization and dredging practices, pesticide and fertilizer application practices and application rates, brine disposal practices, and storm water quality.

The assessment method for the data from the stream Biological Monitoring Program has been modified from the previous 2000 Report as follows:

The biological metrics used in determining aquatic life use support (ALUS) were Macroinvertebrate Biotic Index (MBI), Kansas Biotic Index (KBI), Ephemeroptera, Plecoptera, and Trichoptera (EPT) Index, EPT Abundance, and Mussel % Loss:

ALUS	<u>MBI</u>	<u>KBI-NO</u>	<u>EPT</u>	<u>EPT Abundance</u>	<u>Mussel%Loss</u>
Fully supporting	≤4.5	≤2.60	≥13	≥48%	≤10%
Partially supporting	4.51-5.39	2.61-2.99	12 - 8	47% - 31%	11-25%
Not supporting	≥5.4	≥3.0	<8	≤30%	≥26%

Macroinvertebrate data from 1996 through 2000 and freshwater mussel data from 1990 through 2000 were utilized. A simple average of use support level was determined with a matrix of metrics for each stream segment evaluated. Professional judgment was applied by staff in consideration of historical data trends, adequacy of data, and historical use support levels.

Aquatic life support for the mussel percentage loss metric was based on data from sites with three or more samples and a minimum species richness of five. No sites were given less than a 'fully supporting' ALUS rating unless at least three taxa or greater than 10 % of the mussel community has been lost.

In cases where chemical data and biological data differ in terms of assessment, the department evaluated each discrepancy on a case-by-case basis and the staff used professional judgment for the assignment of the impairment level.

Overall flow chart of the decision process for assessment of ambient stream data is included as Appendix C.

Summary tables, although not required, have been provided as follows:

Table 6a.	Summary of Fully Supporting, Threatened and Impaired Stream Miles
Table 6b.	Summary of Fully Supporting, Threatened, and Impaired Lakes (in acres)
Table 7a.	Individual Use Support Summary for Streams
Table 7b.	Individual Use Support Summary for Lakes
Table 8a.	Total Stream Mileage Impaired by Various Cause Categories
Table 8b.	Total Lake Acres Impaired by Various Cause Categories
Table 9a.	Total Stream Mileage Impaired by Various Source Categories
Table 9b.	Total Lake Acres Impaired by Various Source Categories
Table 10.	Trophic Status of Lakes Assessed During This Reporting Cycle
Table 11.	Trophic State Trends in Lakes
Table 12.	Summary of Domestic Water Supply Use Impairments in Streams
Table 13.	Summary of Domestic Water Supply Use Impairments in Lakes

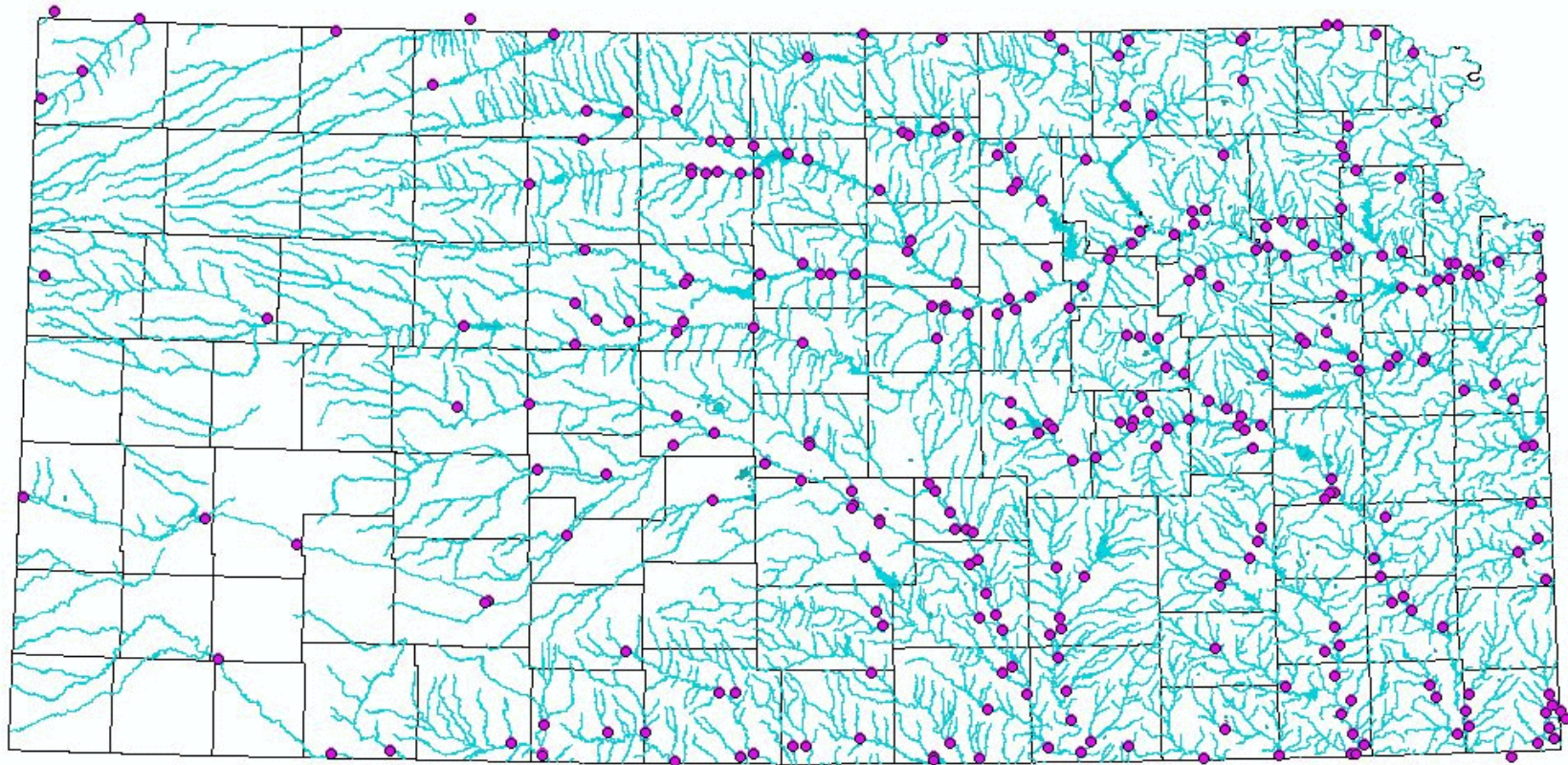
This report shows an increase from the 2000(b) Report of 1,591 in assessed stream miles. This increase is due to differences in mileage associated with additional sites, and the inclusion of sites monitored over a four year span.

The lake and wetland monitoring activities conducted by KDHE have significantly changed since the inception of the program in 1975. Since 1993, the network has consisted of approximately 120-130 monitored sites, with representative lakes in all major river basins and physiographic regions. These lakes and all major publicly owned wetland areas are sampled on a three to five year cycle for nutrients, metals, minerals, pesticides, water clarity, dissolved oxygen, temperature, algal abundance, and bacterial quality (Appendix A.)

In addition to those lakes and wetlands routinely included in this program (and regarded as "monitored" waterbodies for the purposes of this report), a number of additional standing waterbodies were subjected to less intensive investigation during the 1997-2001 reporting cycle. These "evaluated" waterbodies included lakes from which a single grab sample was collected and analyzed for major cations and anions, nutrients and chlorophyll-a. In other cases, additional physicochemical and biological data were collected and/or a watershed survey was conducted.

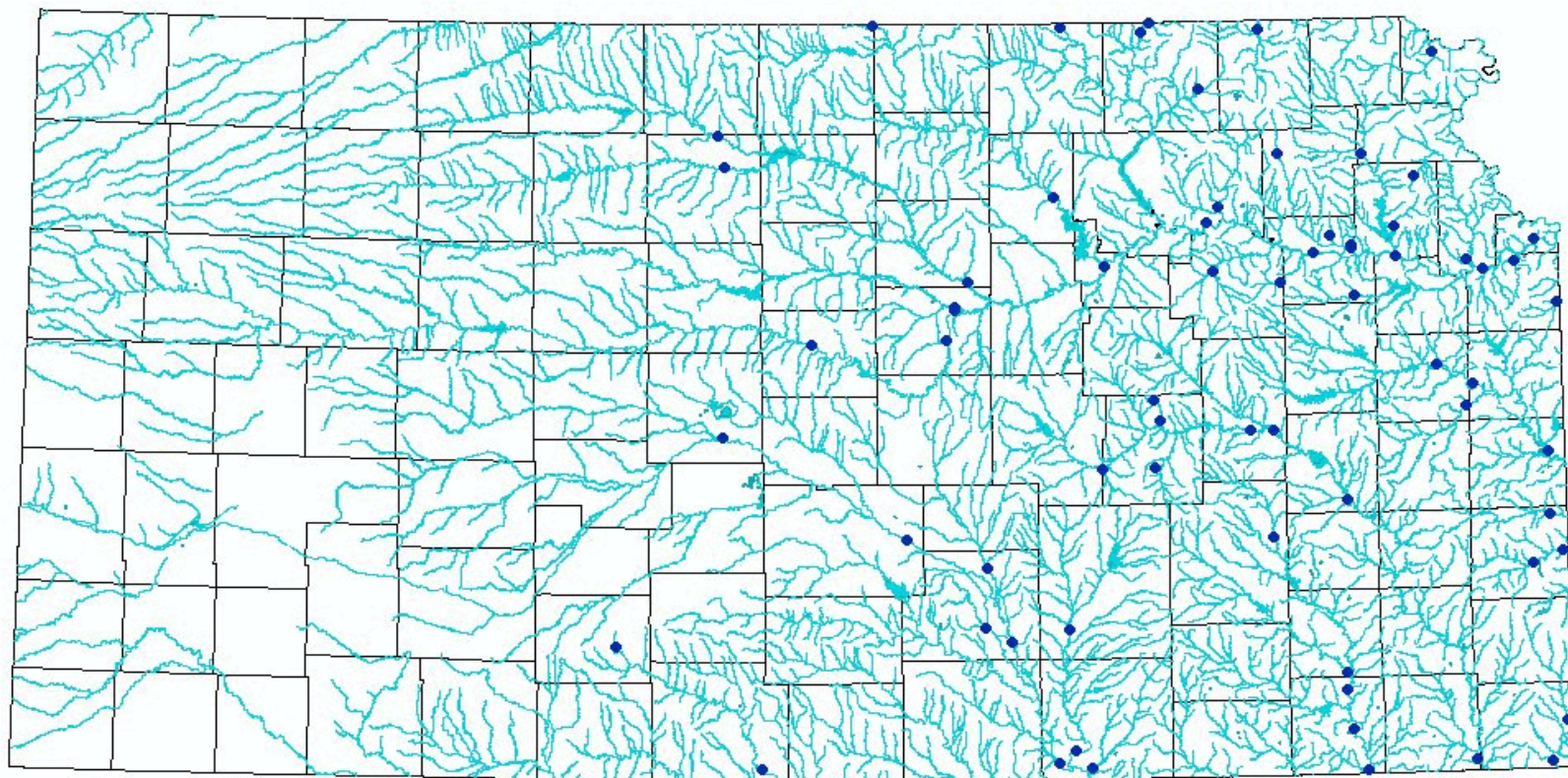
In compliance with Section 314(a)(2) of the Clean Water Act, an assessment report of lake water quality is presented in Appendix D. The required tables are included in Part III.

**FIGURE 1. STREAM CHEMISTRY MONITORING NETWORK
1998 - 2001**

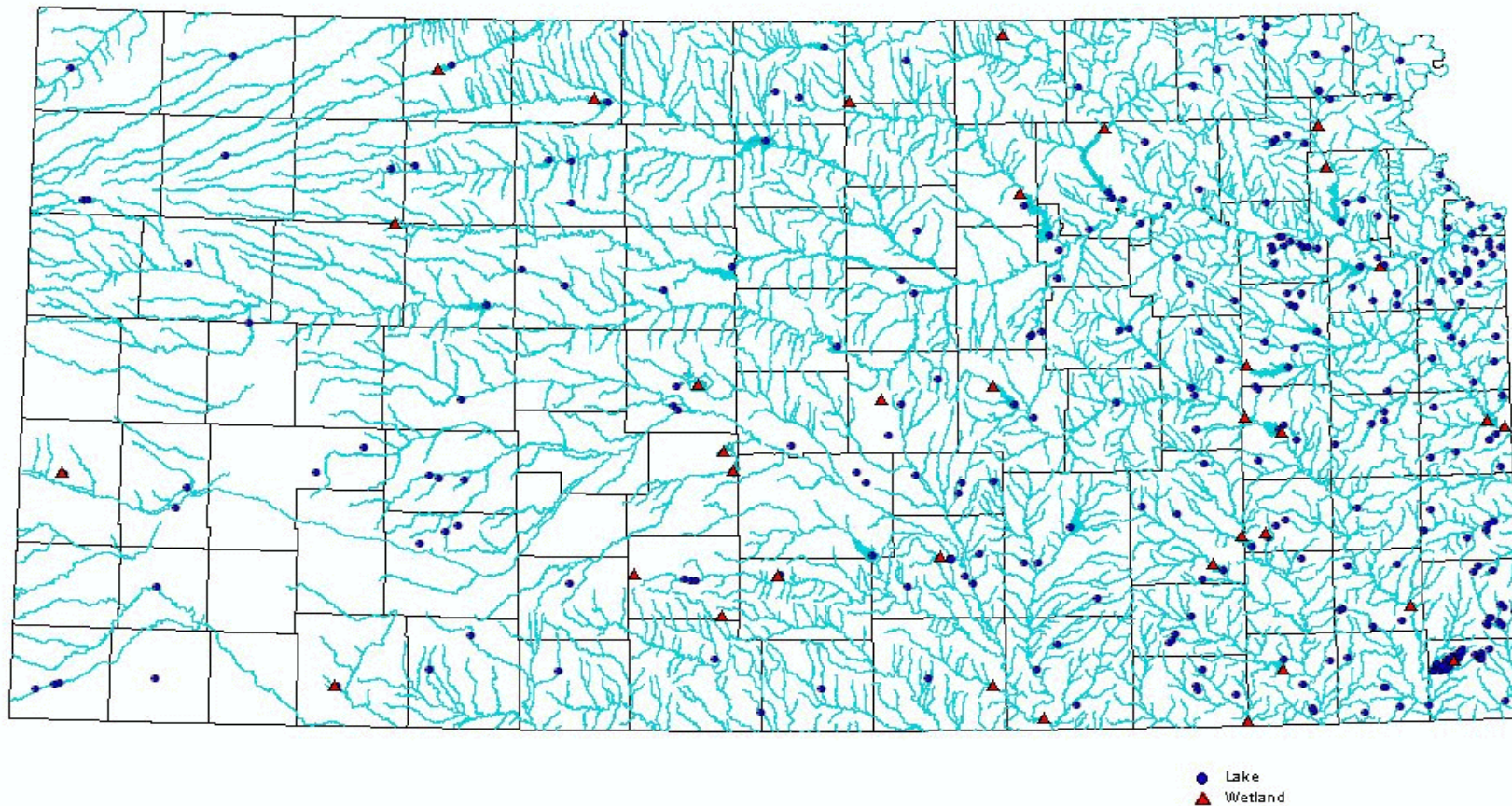


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2002 305(b) REPORT

**FIGURE 2. STREAM BIOLOGICAL MONITORING NETWORK
1996 - 2000**

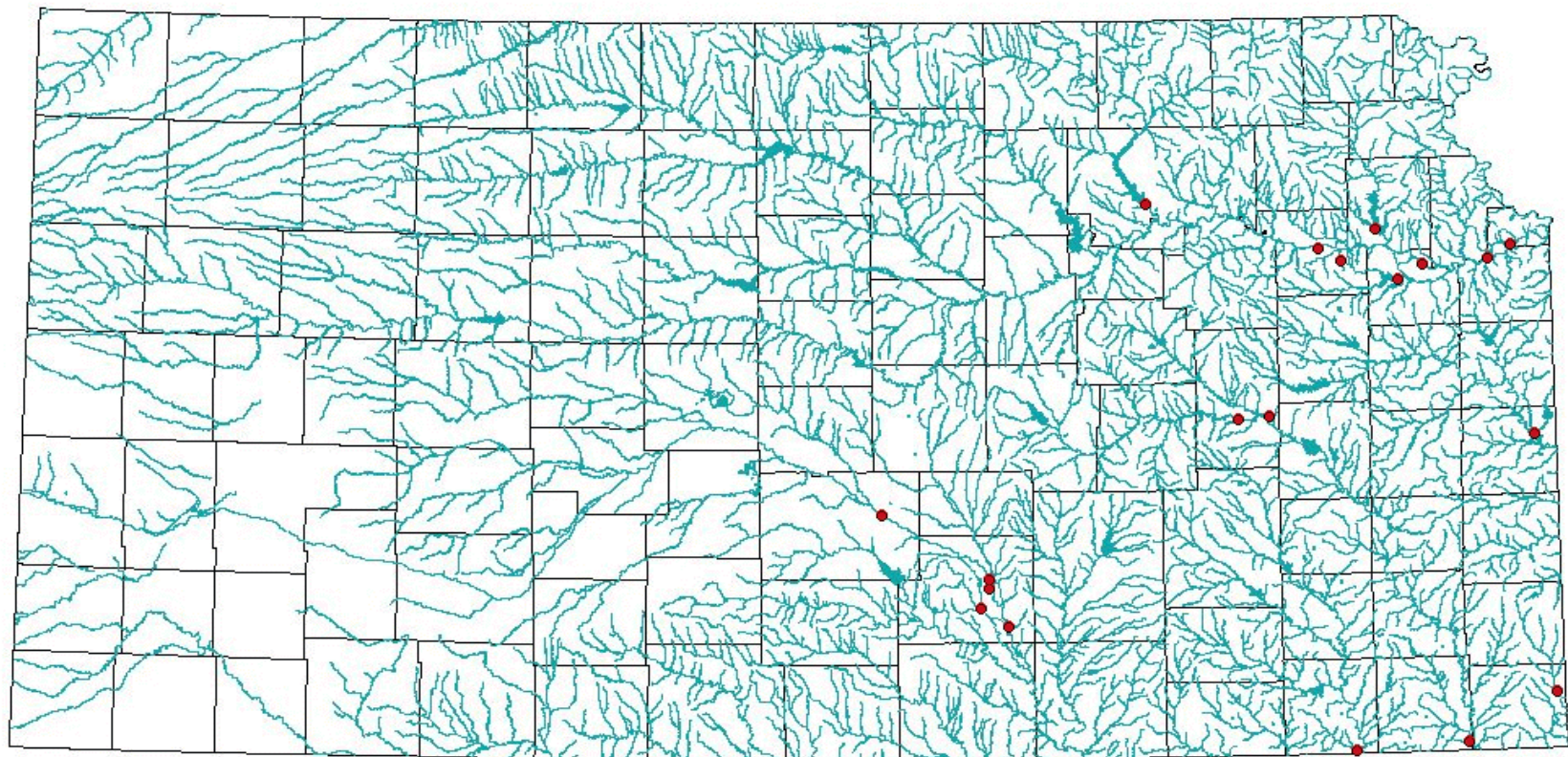


**FIGURE 3. LAKE AND WETLAND MONITORING NETWORK
1997 - 2001**



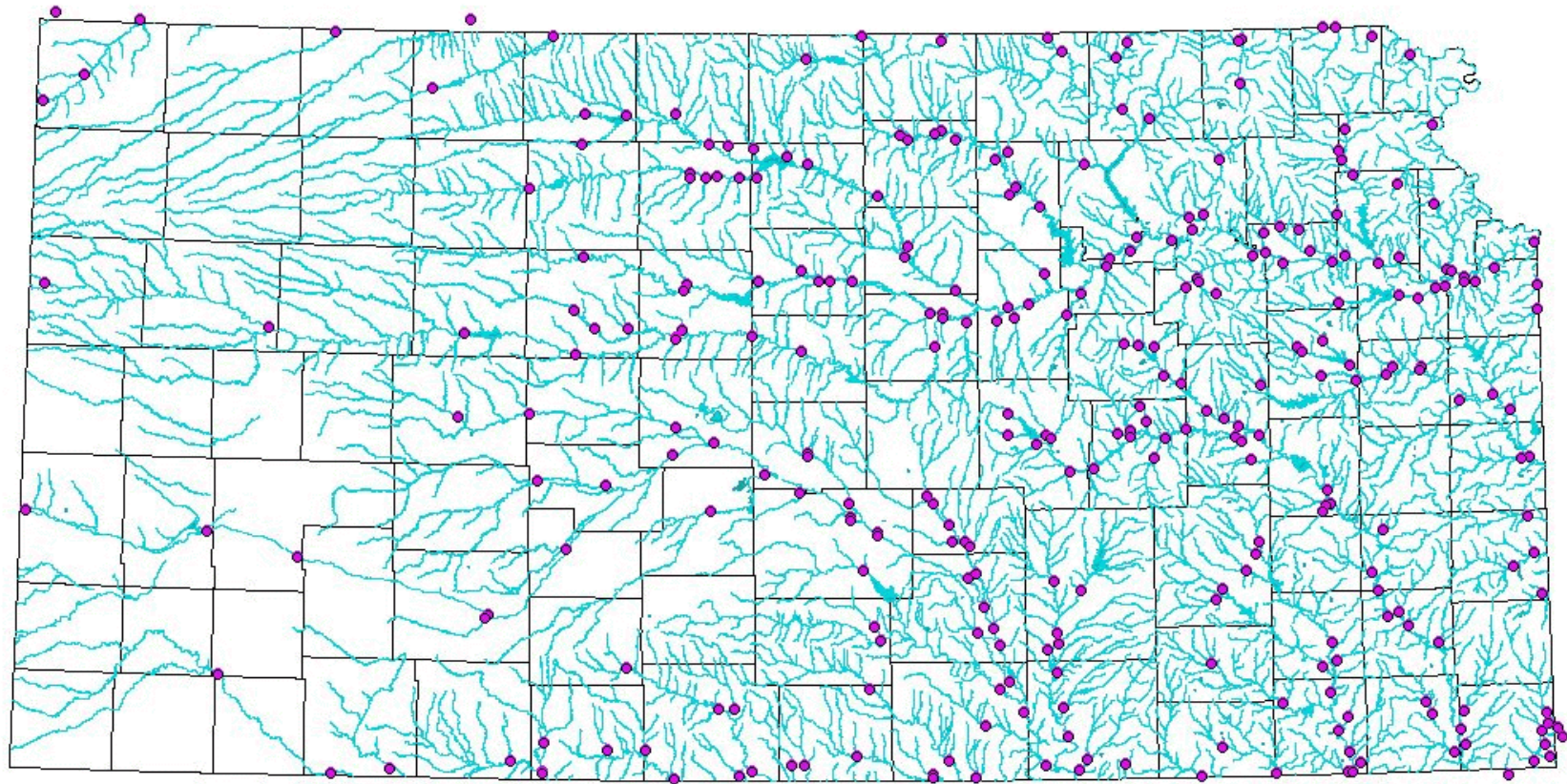
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2002 305(b) REPORT

**FIGURE 4. FISH TISSUE MONITORING NETWORK
1998 - 2000**



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2002 305(b) REPORT

**FIGURE 5. GROUNDWATER MONITORING NETWORK
2000 - 2001**



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2002 305(b) REPORT

Table 6a. Summary of Fully Supporting, Threatened, and Impaired Streams Miles

DEGREE OF USE SUPPORT	ASSESSMENT CATEGORY		TOTAL ASSESSED SIZE
	EVALUATED	MONITORED	
Size Fully Supporting All Assessed Uses	0	4,690	4,690
Size Fully Supporting All Assessed Uses but Threatened for at Least One Use	0	132	132
Size Impaired for One or More Uses	0	15,005	15,005
TOTAL ASSESSED	0	19,827	19,827

Table 6b. Summary of Fully Supporting, Threatened, and Impaired Lakes (in acres)

DEGREE OF USE SUPPORT	ASSESSMENT CATEGORY		TOTAL ASSESSED ACRES
	EVALUATED	MONITORED	
Insufficient Data	7,363	39	7,402
Supporting but threatened for at least one use	2,077	34,694	36,771
Size impaired for one or more uses	3,153	141,161	144,314
Total size assessed	12,593	175,894	188,487

Table 7a. Individual Use Support Summary for Streams (in miles)

GOALS	USE	SIZE ASSESSED	SIZE FULLY SUPPORTING	SIZE FULLY SUPPORTING BUT THREATENED	SIZE PARTIALLY SUPPORTING	SIZE NOT SUPPORTING	SIZE NOT ATTAINABLE
PROTECT AND ENHANCE ECOSYSTEMS	Aquatic Life (acute only)	19,827	12,539	235	4,974	2,079	0
PROTECT AND ENHANCE PUBLIC HEALTH	Fish Consumption	271	99	0	0	172	0
	Shell fishing	*	*	*	*	*	*
	Swimming	*	*	*	*	*	2,025
	Secondary Contact	19,776	9,780	0	8,493	1,493	0
	Domestic Water Supply	8,212	5,054	0	323	2,835	*
SOCIAL AND ECONOMIC	Agricultural**	*	*	*	*	*	*
	Cultural or Ceremonial	*	*	*	*	*	*
	State Defined 1. Irrigation 2. Livestock	7,950 8,054	7,544 7,722	0 0	101 59	304 273	* *
CUMULATIVE MILEAGE		64,090	42,738	235	13,950	7,156	2,025

* = category not applicable

** = see state defined below

0 = category applicable but size of waters in category is zero

Table 7b. Individual Use Summary in Acres for Lakes (in acres)

GOALS	USE	SIZE ASSESSED	SIZE FULLY SUPPORTING BUT THREATENED	SIZE PARTIALLY SUPPORTING	SIZE NOT SUPPORTING	INSUFFICIENT DATA
Protect & Enhance Ecosystems	Aquatic Life (acute criteria)	188,487	100,611	60,619	19,855	7,402
Protect & Enhance Public Health	Fish Consumption**	35,938	35,937	0	1	152,549
	Shellfishing	*	*	*	*	*
	Swimming***	188,487	50,363	126,379	4,343	7,402
	Secondary Contact	188,487	112,832	65,305	2,948	7,402
	Domestic Water Supply	188,487	50,565	83,576	46,944	7,402
Social & Economic Enhancement	Agricultural (irrigation)	188,487	163,844	14,280	2,961	7,402
	Agricultural (livestock)	188,487	163,666	14,240	3,179	7,402
	Cultural	*	*	*	*	*

* = category not applicable

** = based solely on fish consumption advisories, not on food procurement criteria

*** = assessment based on water clarity and trophic state conditions not on fecal coliform exceedences

TABLE 8a. Total Stream Mileage Impaired by Various Cause/Stressor Categories

Cause/Stressor Category	Size of Waters by Contribution to Impairment in Miles	
	Major	Moderate/Minor
Cause/Stressor unknown	*	*
Unknown toxicity	*	*
Pesticides**	186	9
Priority organics	*	*
Nonpriority organics	*	*
Metals	116	276
Ammonia	39	65
Cyanide	*	*
Sulfates	2,307	386
Chlorine	*	*
Other inorganics	305	101
Nutrients**	118	0
pH	436	1,051
Siltation**	370	444
Organic enrichment/low DO	1,413	3,095
Salinity/TDS/chlorides	1,433	317
Thermal modifications	*	681
Flow alterations	*	*
Other habitat alterations	*	72
Pathogen indicators	1,494	8,493
Radiation	*	*
Oil and grease	*	*
Taste and odor	*	*
Suspended solids	*	*
Noxious aquatic plants (macrophytes)	*	*
Total toxics	*	*
Turbidity	*	*
Exotic species	*	*
Excessive algal growth	*	*
Inappropriate littoral vegetation	*	*
Other (specify)	*	*

* = category not applicable for the purposes of this report

** = based on biological site assessments only

Table 8b. Total Lake Acres Impacted by Various Cause Categories (in acres)

CAUSE CATEGORY	ACRES BY CONTRIBUTION TO IMPAIRMENT	
	MAJOR	MODERATE/MINOR
Cause unknown	0	0
Unknown toxicity	-	-
Pesticides	496	15,039
Priority organics	-	-
Nonpriority organics	-	-
Metals	0	17,646
Ammonia	-	-
Chlorine	-	-
Other inorganics (fluoride)	81	204
Nutrients/eutrophication	26,247	115,378
pH	206	6,253
Siltation	*	*
Organic enrichment/low DO	7	30,871
Salinity/TDS/chlorides	9,216	23,339
Thermal modifications	-	-
Flow alterations	277	11,167
Other habitat alterations	-	-
Pathogen indicators	0	1,272
Radiation	-	-
Oil and grease	-	-
Taste and odor**	26,245	-
Suspended solids***	42,604	19,212
Noxious aquatic plants	264	174
Total toxics	-	-
Turbidity***	42,604	19,212
Exotic species	-	-
Other (specify)	-	-

- = Category applicable, no data available.

* = Statewide problem, no direct measurements available

** = Reflects problems severe enough to request KDHE assistance. Other incidents are unreported.

*** = Based on multiple metrics

TABLE 9a. Total Stream Mileage Impaired by Various Source Categories

Source Category	Contribution to Impairment	
	Major	Moderate/Minor
Industrial Point Sources	314	254
Municipal Point Sources	889	3,523
Combined Sewer Overflows	70	38
Collection System Failure	20	40
Domestic Wastewater Lagoon	*	*
Agriculture	4,922	8,463
Crop-related sources	2,835	1,247
Grazing-related sources	1,878	7,690
Intensive Animal Feeding Operations	2,081	8,073
Silviculture	*	*
Construction	32	107
Urban Runoff/Storm Sewers	450	717
Resource Extraction	1,985	312
Land Disposal	135	263
Hydromodification	1,212	611
Habitat Modification (non-hydromod)	1,045	4,286
Marinas and Recreational Boating	*	*
Erosion from Derelict Land	*	*
Atmospheric Deposition	*	*
Waste Storage/Storage Tank Leaks	*	*
Leaking Underground Storage Tanks	*	*
Highway Maintenance and Runoff	113	0
Spills (Accidental)	*	*
Contaminated Sediments	85	5
Debris and Bottom Deposits	*	*
Internal Nutrient Cycling (primarily lakes)	*	*
Sediment Resuspension	*	*
Natural Sources	4,130	3,800
Recreational and Tourism Activities	*	*
Salt Storage Sites	221	0
Groundwater Loadings	*	*
Groundwater Withdrawal	2,377	766
Other	0	75
Unknown Source	0	0
Sources Outside State Jurisdiction/borders	310	368

* = category not applicable

Table 9b. Total Lake Acres Impaired by Various Source Categories

SOURCE CATEGORY	CONTRIBUTION TO IMPAIRMENT	
	MAJOR	MODERATE/MINOR
Industrial Point Sources	-	-
Municipal Point Sources	30,207	116,179
Combined Sewer Overflows	-	-
Agriculture	54,250	95,613
Silviculture	-	-
Construction	-	-
Urban Runoff/Storm Sewers	282	6,963
Resource Extraction	985	1,092
Land Disposals	-	-
Hydromodification	3,446	12,832
Habitat Modification	-	-
Marinas	-	-
Atmospheric Deposition	0	3,920
Contaminated Sediments	-	-
Unknown Source	0	0
Natural Sources*	9,843*	23,404*
Other (specify)	-	-

- = Category applicable, no data available.

* = Refers mainly to in-lake ecophysiological processes (processes secondary to eutrophication, for instance), wind resuspension phenomena, and climate variations, with very little actual background pollution loading from watersheds included.

Table 10. Trophic Status of Lakes Assessed During This Reporting Cycle (Percent of total in parentheses)

TROPHIC STATUS	NUMBER OF LAKES	ACREAGE OF LAKES
Argillotrophic	12 (3.8)	50,600 (26.9)
Oligo-Mesotrophic	7 (2.2)	350 (0.2)
Mesotrophic	24 (7.6)	11,191 (5.9)
Slightly Eutrophic	76 (24.1)	48,993 (26.0)
Fully Eutrophic (Eutrophic)	60 (19.1)	52,795 (28.0)
Very Eutrophic	32 (10.2)	13,370 (7.1)
Low Hypereutrophic	36 (11.4)	1,601 (0.9)
High Hypereutrophic	36 (11.4)	1,968 (1.0)
Dystrophic	0	0
Unknown	32 (10.2)	7,619 (4.0)
Total	315 (100.0)	188,487 (100.0)

Table 11. Trophic State Trends in Lakes (% of total in parentheses)

CATEGORY	NUMBER OF LAKES	ACREAGE OF LAKES
Assessed for Trends	315 (100%)	188,487 (100%)
Improving	11 (3.5%)	23,847 (12.7%)
Stable	92 (29.2%)	130,216 (69.1%)
Degrading	35 (11.1%)	21,408 (11.4%)
Trend Unknown	177 (56.2%)	13,016 (6.8%)

Table 12. Summary of Domestic Water Supply Use Impairments in Streams

Total Stream Mileage Designated for Use: 8,265			
Total Stream Mileage Assessed for Use: 8,212			
	Miles	Percent	Major Causes
Fully Supporting Use	5,054	62	
Fully Supporting Use but Threatened	*	*	
Partially Supporting Use	323	4	
Not Supporting Use	2,835	34	sulfate** chloride** nitrate (1 segment)***
Total Assessed for Use	8,212	100	

* not applicable

** secondary MCLs; not enforceable standard under the Safe Drinking Water Act

*** no known points of diversion

Table 13. Summary of Domestic Water Supply Use Impairments in Lakes

Total Waterbody Area Designated For Use: 149,835 acres (79.5% of Assessed Acres)			
Total Waterbody Area Assessed For Use: (188,487) acres			
	Acres	Percent	Major Causes
Insufficient Data	6,171 (7,402)	4 (4)	
Fully Supporting Use but Threatened	47,400 (50,565)	32 (27)	
Partially Supporting Use	71,846 (83,576)	48 (44)	eutrophication chloride* sulfate*
Not Supporting Use	24,418 (46,944)	16 (25)	eutrophication atrazine chloride* sulfate*
Total Assessed For Use	149,835 (188,487)	100 (100)	

*secondary MCLs; not enforceable standard under the Safe Drinking Water Act

PART IV: GROUNDWATER

There are no significant changes since the previous 2000 305(b) Report.

Summary tables, although not required, have been provided as follows:

Table 14.	Summary of State Groundwater Protection Programs
Table 15.	Major Sources of Groundwater Contamination
Table 16.	Groundwater Contamination Summary
Table 17.	Aquifer Monitoring Data

Table 14. Summary of State Groundwater Protection Programs

Programs or Activities	Check (X)	Implementation Status	Responsible State Agency
Active SARA Title III program	X	fully established	KDHE*
Ambient groundwater monitoring	X	fully established	KDHE
Aquifer vulnerability assessment	X	on going	KDHE*
Aquifer mapping	X	fully established	KGS
Aquifer characterization	X	on going	KGS
Comprehensive data management	X	on going	KDHE
EPA-endorsed Core Comprehensive State Groundwater Protection Program	X	under review	KDHE
Groundwater discharge permits	X	fully established	KDHE
Groundwater Best Management Practices	X	fully established	KDHE
Groundwater legislation			
Groundwater classification			
Groundwater quality standards	X	not established	KDHE
Interagency coordination for groundwater protection initiatives	X	on going	KWO
NPS controls	X	fully established	KDHE*
Pesticide State Management Plan	X	pending EPA approval	KDA
Pollution Prevention Program	X	fully established	KDHE
RCRA Primacy	X	fully established	KDHE
State Superfund	X	fully established	KDHE
State RCRA with more stringent requirements than RCRA Primacy	X	fully established	KDHE
State septic system regulations	X	fully established	KDHE
Underground Storage Tank (UST) installation requirements	X	fully established	KDHE
UST Remediation Fund	X	fully established	KDHE
UST Permit Program	X	fully established	KDHE
Underground Injection Control Program	X	fully established	KCC & KDHE
Vulnerability assessment for drinking water/wellhead protection	X	EPA approved plan implementation proceeding	KDHE
Well abandonment regulations	X	fully established	KDHE
Wellhead Protection Program (EPA-approved)	X	EPA approved plan implementation proceeding	KDHE
Well installation regulations	X	fully established	KDHE

*principal administrative agency

Table 15. Major Sources of Groundwater Contamination

Ten Highest Priority Contaminant Sources	Factors Considered in Selecting a Contaminant Source	Types of Contaminants
AGRICULTURAL ACTIVITIES: Ag. chemical facilities/applications	D,A,C	E,B,C
Animal feedlots	D,A,C	J,E
STORAGE AND TREATMENT: Storage tanks (AST/LUST)	D,B,A,C	D
Surface impoundments	E,A	J,E
DISPOSAL ACTIVITIES: Landfills/illegal dumping	E,C,A	H
OTHER: Active/abandoned industrial facilities	A,B,C	C,H
Oil and gas activities	D,A,B,C	D,G
Pipelines and sewer lines	E,A	D,E
Salt water intrusion	E,C,B	G
Spills	D,A	D,C
<p>Factors Considered in Selecting a Contaminant Source: (A) Human health and/or environmental risk (toxicity) (B) Size of population at risk (C) Location of sources relative to drinking water sources (D) Number and/or size of contaminant sources (E) Hydrogeologic sensitivity</p> <p>Types of Contaminants: (A) Inorganic pesticides (B) Organic pesticides (C) Halogenated solvents (D) Petroleum compounds (E) Nitrate (F) Fluoride (G) Salinity/brine (H) Metals (I) Radionuclides (J) Bacteria (K) Protozoa (L) Viruses</p>		

Table16. Groundwater Contamination Summary. Statewide Cumulative Summary Through December 31, 2001

Source Type	# of Kansas Sites	# of Sites with Confirmed Releases	# with Confirmed Groundwater Contamination	Primary Contaminants	# of Site Assessments	# of Sites with Source Removed	# of Sites with CAPs	# of Sites with Active Remediation	# of Sites with Cleanup Resolved
NPL	13	13	13	VOCs, metals	13	unavailable	1	7	5
CERCLIS (non-NPL)	690	690	690	VOCs, metals & pesticides	690	unavailable	unavailable	127	89
DOD/DOE	43	43	43	VOCs, metals	43	unavailable	unavailable	6	1
LUST	9,581	4,973	2,428	gasoline and diesel fuels	9,581	3,965	unavailable	2,683	2,463
RCRA Corrective Action	under EPA control								
Underground Injection *	39	1	0	methane	1	1	1	1	0
State Sites **	647	647	647	VOCs, metals	647	unavailable	unavailable	121	88
NPS	unknown								

CAPs - Corrective Action Plans

CERCLIS - Comprehensive Environmental Response, Compensation, and Liability Information System

DOD/DOE - Department of Defense/Department of Energy

LUST - Leaking Underground Storage Tanks

NPL - National Priority List

NPS - Non Point Source

RCRA - Resource Conservation and Recovery Act

* Represents Class I and III injection wells and hydrocarbon storage sites, but does not include Class II brine injection wells.

** Numbers do not include sites under KCC jurisdiction or LUST sites.

Table17. Aquifer Monitoring Data

Statewide summary for the period of 2000-2001

Monitoring Data Type	Total # of Well Samples in the Assessment	Parameter Groups	Parameters Not Detected or Nitrate ≤ 5 mg/L	Parameters Detected or Nitrate >5 to ≤ 10 mg/L	Parameters Exceeding the MCLs	Removed From Service	Special Treatment	Background Parameters Exceeding MCLs
Ambient Groundwater Quality Monitoring Network	45	VOCs	35	10*	0			
	190	Pesticides	169	21	0			
	190	Arsenic	91	99	1			1
	190	Nitrate	140	50	17			
	190	Selenium	113	77	1			1
	41	Radionuclides	3	38	1			1

NOTES: (1) Some wells may of been sampled more than once during the reporting period (2000-2001).
 (2) All data obtained from the Kansas Groundwater Quality Monitoring Network only.
 (3) Only inorganic parameters with federal drinking water MCLs were included in this summary.
 (4) Some of the contaminated wells are presently used for monitoring purposes only.
 (5) Groundwater monitoring network samples were collected after well purging and prior to any treatment.
 (*) Some wells have more than one VOC parameter detected.

Appendix A: List of Parameters

Stream Program

Routine "Inorganic" Parameters

Alkalinity, total
Aluminum
Ammonia
Antimony
Arsenic
Barium
Beryllium
Biochemical oxygen demand
Boron, total
Bromide
Cadmium
Calcium, total
Chloride
Chromium
Cobalt
Copper
Dissolved oxygen
Fluoride
Hardness, total
Iron
Kjeldahl nitrogen
Lead
Magnesium, total
Manganese
Mercury
Molybdenum
Nickel
Nitrate
Nitrite
Phosphate, ortho-
Phosphorus, total
Potassium, total
Selenium
Silica, total
Silver
Sodium, total
Specific conductance
Sulfate
Thallium
Total dissolved solids
Total organic carbon
Total suspended solids
Turbidity
Vanadium
Zinc

Routine Microbiological Parameters

Fecal coliform bacteria
Fecal streptococcus bacteria

Field Measurements

pH
Temperature

Routine Organic Parameters

2,4-D
2,4,5-T
2,4,5-TP
Acetochlor
Alachlor
Aldrin
Atrazine
Alpha-BHC
Beta-BHC
Delta-BHC
Gamma BHC (Lindane)
Butachlor
Carbofuron (Furadan)
Chlordane
Cyanazine (Bladex)
DCPA (Dacthal)
DDD
DDE
DDT
Dieldrin
Endosulfan I
Endosulfan II
Endosulfan Sulfate
Endrin
Heptachlor
Heptachlor epoxide
Hexachlorobenzene
Methoxychlor
Metolachlor (Dual)
Metribuzin (Sencor)
PCB-1016
PCB-1221
PCB-1232
PCB-1242
PCB-1248
PCB-1254
PCB-1260
Picloram (Tordon)
Propachlor (Ramrod)
Propazine (Milogard)
Simazine
Toxaphene

Non-Routine "Organic" Parameters

Diazinon
Deethylatrazine
Deisopropylatrazine
Prometon

Fish Tissue Program Fillet Analysis

Routine Inorganic Parameters

Cadmium
Chromium
Lead
Mercury

Routine Organic Parameters

p,p'-DDD
p,p'-DDE
p,p'-DDT
Dieldrin
Heptachlor
Heptachlor epoxide
Hexachlorobenzene
gamma-Hexachlorocyclohexane
PCB-1016
PCB-1221
PCB-1232
PCB-1242
PCB-1248
PCB-1254
PCB-1260
Pentachloroanisole
Technical Chlordane
 Oxychlordane
 cis-Chlordane
 trans-Chlordane
 cis-Nonachlor
 trans-Nonachlor
Trifluralin (Treflan)

Wholefish Analysis

Routine Inorganic Parameters

Cadmium
Lead
Mercury
Selenium

Routine Organic Parameters

1,2,4,5,-Tetrachlorobenzene
p,p'-DDD
p,p'-DDE
p,p'-DDT
Diazinon
Dieldrin
Heptachlor
Heptachlor epoxide
Hexachlorobenzene
gamma-Hexachlorocyclohexane
Mirex
PCB-1248
PCB-1254
PCB-1260
Pentachloroanisole
Technical Chlordane
 Oxychlordane
 cis-Chlordane
 trans-Chlordane
 cis-Nonachlor
 trans-Nonachlor
Trifluralin (Treflan)

Lake Program

Routine "Inorganic" Parameters

Alkalinity, total
Aluminum
Ammonia
Antimony
Arsenic
Barium
Beryllium
Boron
Bromide
Cadmium
Calcium
Chloride
Chromium
Cobalt
Copper
Fluoride
Hardness, total
Iron
Kjeldahl nitrogen
Lead
Magnesium
Manganese
Mercury
Molybdenum
Nickel
Nitrate
Nitrite
Ortho-phosphate
pH
Phosphorus, total
Potassium
Selenium
Silica
Silver
Sodium
Specific conductance
Sulfate
Thallium
Total dissolved solids
Total organic carbon
Total suspended solids
Turbidity
Vanadium
Zinc

Routine Organic Parameters

2,4-D
2,4,5-T
Acetochlor
Alachlor
Aldrin
Atrazine
Butachlor
Carbofuran
Chlordane
Cyanazine
DCPA (Dacthal)
p,p'-DDD
p,p'-DDE
p,p'-DDT
Dieldrin
Endosulfan I & II
Endosulfan sulfate
Endrin
Alpha BHC
Beta BHC
Gamma BHC (Lindane)
Delta BHC
Heptachlor
Heptachlor epoxide
Hexachlorobenzene
Hexachlorocyclopentadiene
Methoxychlor
Metolachlor
Metribuzin
PCB-1016
PCB-1221
PCB-1232
PCB-1242
PCB-1248
PCB-1254
PCB-1260
Picloram
Propachlor
Propazine
Silvex (2,4,5-TP)
Simazine
Toxaphene

Routine Microbiological Parameters

Fecal coliform bacteria

Lake Program - continued

Miscellaneous

Algal taxonomy*
Chlorophyll-a
Dissolved oxygen
Macrophyte abundance*
Photosynthetically active radiation (PAR)*
Secchi depth*
Temperature
Total inorganic carbon (by calculation)

* not chemical analyses

Occasional Parameters (special projects)

Biological oxygen demand
Chemical oxygen demand
Deethylatrazine
Deisopropylatrazine
Zooplankton taxonomy*

* not chemical analyses

Groundwater Program

Routine Physical Properties

Temperature

Routine "Inorganic" Parameters

Alkalinity (as CaCO₃)

Aluminum

Ammonia (as N)

Antimony

Arsenic

Barium

Beryllium

Boron, total

Bromide

Cadmium

Calcium, total

Chloride

Chromium

Cobalt

Copper

Fluoride

Hardness, total

Iron

Lead

Magnesium, total

Manganese

Mercury

Molybdenum

Nickel

Nitrate (as N)

Nitrite (as N)

pH

Phosphorus, total (as P)

Potassium, total

Selenium

Silica, total

Silver

Sodium, total

Specific conductance

Sulfate

Thallium

Total Dissolved Solids

Vanadium

Zinc

Routine Organic Parameters

2,4-D

2,4,5-T

Acetochlor

Alachlor

Aldrin

Atrazine

alpha-BHC

beta-BHC

delta-BHC

Bladex (Cyanazine)

Butachlor

Carbofuran (Furadan)

Chlordane

DCPA (Dacthal)

Dieldrin

Endosulfan I

Endosulfan II

Endosulfan Sulfate

Endrin

Heptachlor

Heptachlor epoxide

Hexachlorocyclopentadiene

Hexachlorobenzene

Lindane (Gamma BHC)

Methoxychlor

Metolachlor

PCB-1016

PCB-1221

PCB-1232

PCB-1242

PCB-1248

PCB-1254

PCB-1260

p,p'-DDD

p,p'-DDE

p,p'-DDT

Propazine

Ramrod (Propachlor)

Sencor (Metribuzin)

Silvex

Simazine

Tordon (Picloram)

Toxaphene

Routine Purgable Organic Parameters

1,2-dichlorobenzene

1,3-dichlorobenzene

1,4-dichlorobenzene

1,1-dichloroethane

1,2-dichloroethane

1,1-dichloroethylene

1,2-dichloropropane

Groundwater Program - continued

1,1,2,2-tetrachloroethane
Groundwater Program
1,1,1-trichloroethane
1,1,2-trichloroethane
Benzene
Bromodichloromethane
Bromoform
Bromomethane
Chlorobenzene
Chloroethane
Chloromethane
Cis 1,3-dichloropropene
Cis 1,2-dichloroethylene
Dibromochloromethane
Dichloromethane
Ethylbenzene
Tetrachloroethylene
Tetrachloromethane
Toluene
Trans 1,3-dichloropropene
Trans 1,2-dichloroethylene
Trichloroethylene
Trichloromethane
Vinyl chloride
Xylene

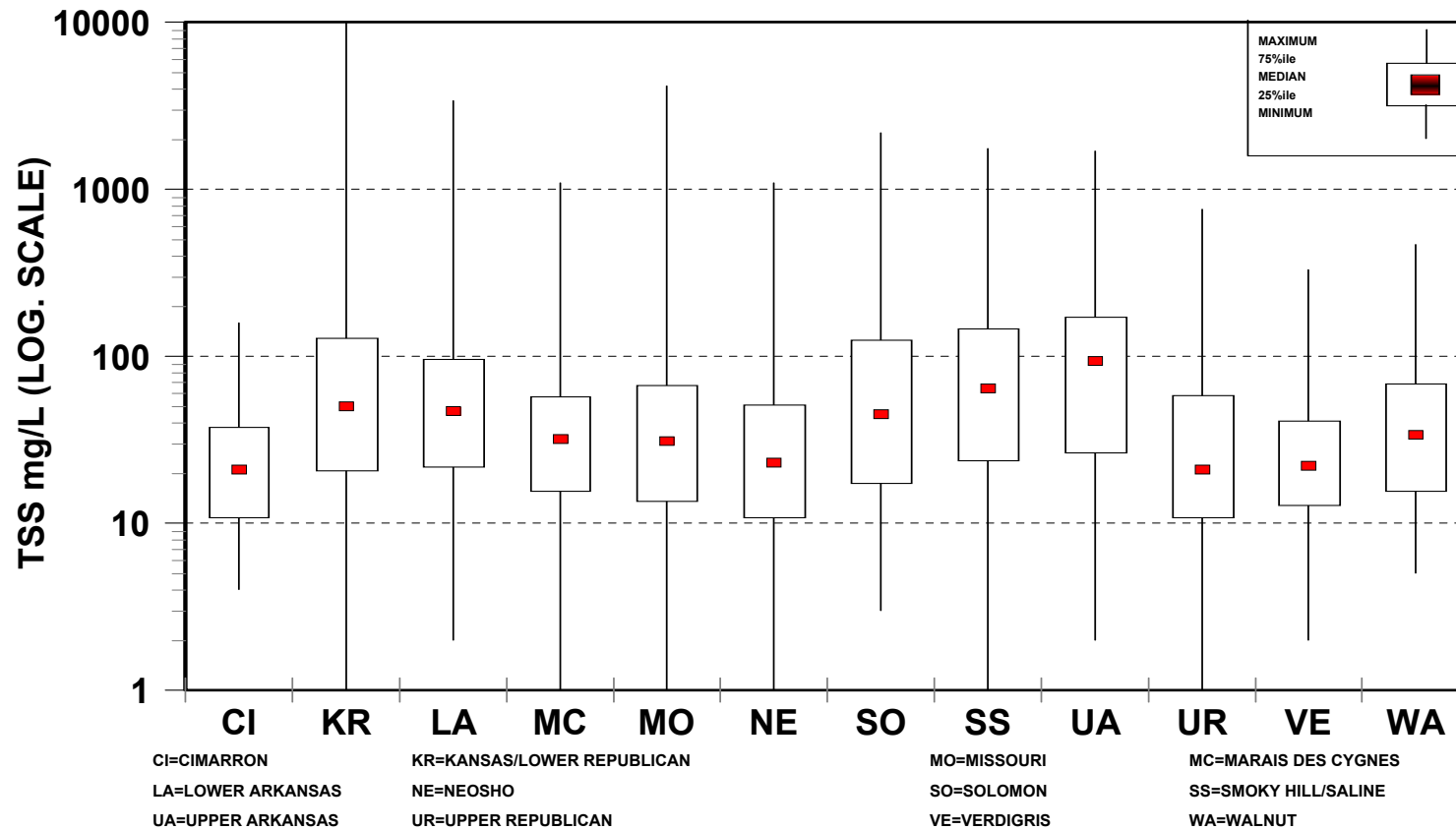
Routine Radiological Parameters

Gross alpha
Gross Uranium
Radium-226
Radium-228
Radon-222

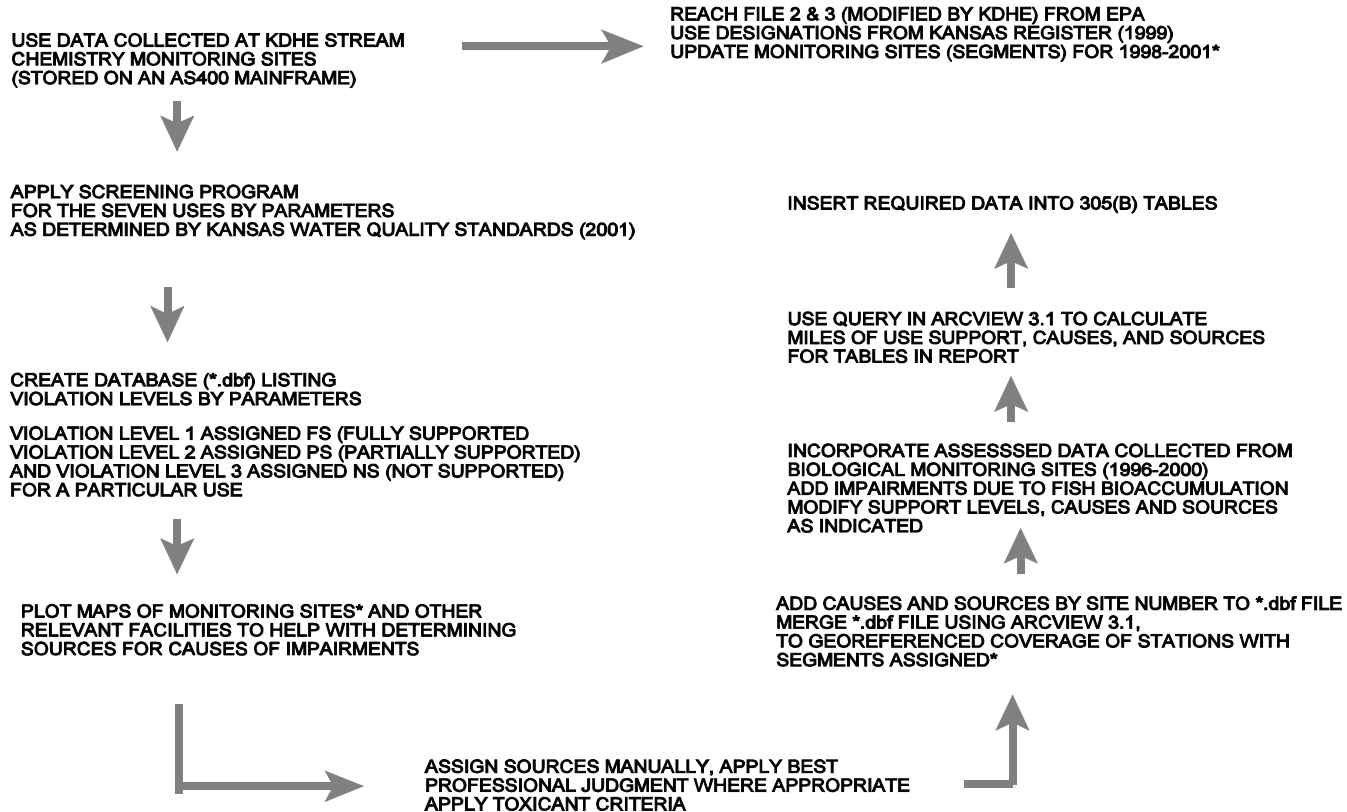
Non-Routine "Organic" Parameters

Diazinon
Deethylatrazine
Deisopropylatrazine
Prometon

TSS CONCENTRATIONS IN KANSAS BASINS 1998 - 2001



APPENDIX C STREAM ASSESSMENT PROTOCOL



APPENDIX D

Clean Lakes and Wetlands*

(Only data differing significantly from the previous reporting cycle are provided)

Summary Statistics

Table 1. Categories of Data used in ALUS Assessments for Lakes

DEGREE OF ALUS (acute criteria only)	ACRES ASSESSED BASED ON BIOLOGICAL HABITAT DATA ONLY	ACRES ASSESSED BASED ON PHYSICAL/ CHEMICAL DATA ONLY	ACRES ASSESSED BASED ON/ BIOLOGICAL/ CHEMICAL DATA	TOTAL ACRES ASSESSED FOR ALUS
Insufficient data	0	0	0	7,402
Fully supported but threatened	0	0	100,611	100,611
Partially supported	0	0	60,619	60,619
Not supported	0	0	19,855	19,855

Table 2. Lake Acreage With Identifiable Point and Nonpoint Source Pollution Contributions

POLLUTION TYPE	NUMBER OF LAKES*	ACRES OF LAKES
Point Sources	28	146,386
Nonpoint Sources	246	175,481
No Identifiable Pollution Sources	69	13,006

*Numbers include any level of point source inputs, and any magnitude or combination of NPSs.

Due to the fact that a number of lakes have both source types within their watersheds, the numbers will not necessarily total to the acres/numbers of lakes reported in this chapter.

Clean Lakes Program

(Only data differing significantly from the previous reporting cycle are provided.)

Background

A total of 315 publicly owned or publicly accessible lakes are included in this reporting cycle. This represents all such lakes known to KDHE through monitoring activities and reports published by other agencies. These lakes comprise 188,487 surface acres.

Trophic Status

The majority of lakes fall into the slightly-to-fully eutrophic and hypereutrophic categories, while the vast majority of surface acreage falls into the argillotrophic and slightly-to-fully eutrophic categories. This primarily results from the influence that lake size (area, volume, depth) exerts on lake trophic state development. Many of the larger lakes in the state are mesotrophic-to-eutrophic, or suffer from high turbidity, while many of the small lakes in Kansas develop hypereutrophic conditions, based in some part on hydrologic and morphometric influences. While a significant percentage of reported lakes have not been assessed for their trophic status (10.1%), they constitute only about 4% of the total reported acreage.

Table 3. Trophic Status of Lakes Assessed During This Reporting Cycle (Percent of total in parentheses)

TROPHIC STATUS	NUMBER OF LAKES	ACREAGE OF LAKES
Argillotrophic	12 (3.8)	50,600 (26.9)
Oligo-Mesotrophic	7 (2.2)	350 (0.2)
Mesotrophic	24 (7.6)	11,191 (5.9)
Slightly Eutrophic	76 (24.1)	48,993 (26.0)
Fully Eutrophic (Eutrophic)	60 (19.1)	52,795 (28.0)
Very Eutrophic	32 (10.2)	13,370 (7.1)
Low Hypereutrophic	36 (11.4)	1,601 (0.9)
High Hypereutrophic	36 (11.4)	1,968 (1.0)
Dystrophic	0	0
Unknown	32 (10.2)	7,619 (4.0)
Total	315 (100.0)	188,487 (100.0)

Control Methods

(No new data to report.)

Restoration/Rehabilitation Efforts

(No new data to report.)

Impaired and Threatened Lakes

Table 4 summarizes overall use support ratings for lakes assessed during this reporting cycle. Impairments related to chronic aquatic life support criteria were not included in the analysis, except as mentioned previously. Support rating for individual designated uses for lakes is presented in Table 5.

Table 4. Summary of Fully Supporting, Threatened, and Impaired Lakes

DEGREE OF USE SUPPORT	ASSESSMENT CATEGORY		TOTAL ASSESSED ACRES
	EVALUATED	MONITORED	
Insufficient Data	7,363	39	7,402
Supporting but threatened for at least one use	2,077	34,694	36,771
Size impaired for one or more uses	3,153	141,161	144,314
Total size assessed	12,593	175,894	188,487

The majority of lake surface acres in Kansas are considered to be monitored (Table 4). This is primarily due to the inclusion of all the federal impoundments within the KDHE Lake and Wetland Monitoring Program. These 24 lakes comprise the majority of the reported surface acreage in the state.

All monitored lakes have data for a range of heavy metals and pesticides, including a number of those substances defined as “toxics” by the EPA. Out of the total reported acreage (188,487 acres) 175,606 acres are surveyed for total recoverable metals and pesticides (93.7% of the total). Of the total acres assessed for toxics, 32,709 acres (18.5% of total) demonstrated some level of impairment or exceedence due to metals or pesticides. Table 6 shows assessment data pertaining to the causes of use impairments in lakes in Kansas while Table 7 lists contaminant sources responsible for lake use impairments.

Table 5. Individual Use Summary in Acres for Lakes

GOALS	USE	SIZE ASSESSED	SIZE FULLY SUPPORTING BUT THREATENED	SIZE PARTIALLY SUPPORTING	SIZE NOT SUPPORTING	INSUFFICIENT DATA
Protect & Enhance Ecosystems	Aquatic Life (acute criteria)	188,487	100,611	60,619	19,855	7,402
Protect & Enhance Public Health	Fish Consumption**	35,938	35,937	0	1	152,549
	Shellfishing	*	*	*	*	*
	Primary Contact	188,487	50,363	126,379	4,343	7,402
	Secondary Contact	188,487	112,832	65,305	2,948	7,402
	Domestic Water Supply	188,487	50,565	83,576	46,944	7,402
Social & Economic Enhancement	Agricultural (irrigation)	188,487	163,844	14,280	2,961	7,402
	Agricultural (livestock)	188,487	163,666	14,240	3,179	7,402
	Cultural	*	*	*	*	*

* = category not applicable

** = based solely on fish consumption advisories, not on food procurement criteria

*** = assessment based on water clarity and trophic state conditions not on fecal coliform exceedences

Acid Effects on Lakes

A total of 181,085 acres of lakes in Kansas were monitored or evaluated for pH, out of the total reported during this cycle. In all, >96% of reported lake acres were assessed for pH (100% of monitored lake acres).

A total of 6,416 lake acres are impacted by high pH during the 1997-to-2001 reporting period. In all cases, high summer time pH incidents are related to periods of intense phytoplankton or macrophytic productivity. The 43 acres impacted by low pH are due to the effects of spoil pile drainage from older coal mining operations.

Table 6. Total Lake Acres Impacted by Various Cause Categories

CAUSE CATEGORY	ACRES BY CONTRIBUTION TO IMPAIRMENT	
	MAJOR	MODERATE/MINOR
Cause unknown	0	0
Unknown toxicity	-	-
Pesticides	496	15,039
Priority organics	-	-
Nonpriority organics	-	-
Metals	0	17,646
Ammonia	-	-
Chlorine	-	-
Other inorganics (fluoride)	81	204
Nutrients/eutrophication	26,247	115,378
pH	206	6,253
Siltation	*	*
Organic enrichment/low DO	7	30,871
Salinity/TDS/chlorides	9,216	23,339
Thermal modifications	-	-
Flow alterations	277	11,167
Other habitat alterations	-	-
Pathogen indicators	0	1,272
Radiation	-	-
Oil and grease	-	-
Taste and odor**	26,245	-
Suspended solids	42,604	19,212
Noxious aquatic plants	264	174
Total toxics	-	-
Turbidity	42,604	19,212
Exotic species	-	-
Other (specify)	-	-

- = Category applicable, no data available.

* = Statewide problem, no direct measurements available

** = Reflects problems severe enough to request KDHE assistance. Other incidents are unreported.

Table 7. Total Lake Acres Impaired by Various Source Categories

SOURCE CATEGORY	CONTRIBUTION TO IMPAIRMENT	
	MAJOR	MODERATE/MINOR
Industrial Point Sources	-	-
Municipal Point Sources	30,207	116,179
Combined Sewer Overflows	-	-
Agriculture	54,250	95,613
Silviculture	-	-
Construction	-	-
Urban Runoff/Storm Sewers	282	6,963
Resource Extraction	985	1,092
Land Disposals	-	-
Hydromodification	3,446	12,832
Habitat Modification	-	-
Marinas	-	-
Atmospheric Deposition	0	3,920
Contaminated Sediments	-	-
Unknown Source	0	0
Natural Sources*	9,843*	23,404*
Other (specify)	-	-

- = Category applicable, no data available.

* = Refers mainly to in-lake ecophysiological processes (processes secondary to eutrophication, for instance), wind resuspension phenomena, and climate variations, with very little actual background pollution loading from watersheds included.

Trends in Lake Water Quality

Time trends in lake water quality are difficult to determine, given that the chemical data do not lend themselves well to statistical analysis at this time. Trophic state remains the indicator of overall lake water quality for the determination of trends within this report. If a given lake had trophic state assessments for three, or more, occasions during the last sixteen years, then a trend of "improving," "degrading," or "stable" was assigned. If no recent trophic state data were available, or if the most recent data were more than eight years old, then a trend classification of "unknown" was assigned. Table 8 presents the lake trophic state trends for this reporting period.

Table 8. Trophic State Trends in Lakes (% of total in parentheses)

CATEGORY	NUMBER OF LAKES	ACREAGE OF LAKES
Assessed for Trends	315 (100%)	188,487 (100%)
Improving	11 (3.5%)	23,847 (12.7%)
Stable	92 (29.2%)	130,216 (69.1%)
Degrading	35 (11.1%)	21,408 (11.4%)
Trend Unknown	177 (56.2%)	13,016 (6.8%)

According to the data in Table 8, the majority of lakes are of unknown trophic state trend, but they constitute less than seven percent of the total reported acreage. These are the small lakes that have undergone assessment, but have not been monitored for trophic state over time. Therefore, trends cannot be determined. Of the monitored lake acreage in Kansas, over 70% is stable over time, while slightly less than 12% appear to be degrading over time. Only about 13% of lake acres in the state have shown any appreciable improvement in trophic state condition during this reporting cycle.

Wetlands Assessment

(Only data differing significantly from the previous reporting cycle are provided.)

Extent of Wetland Resources

(No new data to report.)

Integrity of Wetland Resources

Out of the 35,607 wetland acres (35 wetlands total) assessed during this reporting cycle, 25,069 acres (9 wetlands total) are considered to be monitored sites. This represents 70% of the total acres reported, and 26% of the total number of reported wetlands. An additional 10,538 acres of wetland are reported as evaluated (26 wetlands, 74% of the total). Roughly 8.2-to-9.9% of the state's wetland acres are assessed.

At a minimum wetlands are designated for secondary contact recreation, food procurement, and aquatic life support uses. Wetlands are not generally designated for other uses in Kansas. Overall aquatic life use support (acute criteria only, with the exception of pesticides) is as follows, in terms of total reported acreage (monitored and/or evaluated sites): 40 acres are fully supported but threatened (<1%), 9,082 acres have insufficient data for an assessment (26%), 1,571 acres are partially supported (4%), and 24,914 acres are not supported (70%). These numbers refer primarily to exceedences of acute aquatic life support criteria, although numbers were not significantly different when chronic criteria were analyzed.

Levels of secondary contact recreational use support are as follows, in terms of reported acreage: 70 acres are fully supported but threatened (<1%), 9,082 acres have insufficient data for an assessment (26%), 1,628 acres are partially supported (4%), and 24,826 acres are not supported (70%).

The primary causes of partial and/or nonsupport of designated uses in Kansas' wetlands are excessive nutrient load, heavy metals, salinity, elevated pH, flow alterations, low dissolved oxygen, and turbidity/siltation. The major sources of partial and/or nonsupport of designated uses are agriculture, hydromodifications in watersheds, and natural processes (wetland ecophysiological processes and natural climate variations), with contributions by wildlife.

Out of the 25,069 monitored wetland acres in Kansas, 100% are monitored for toxics (heavy metals, pesticides, and ammonia). Due to a special wetland assessment project (discussed further on) a large number of normally evaluated wetlands were assessed for toxics through the year 2000. During this reporting cycle, 17,495 acres of wetlands were impacted by toxics (49% of reported acres).

During this reporting cycle, 24,845 wetland acres were assessed as hypereutrophic (69.8%), 139 acres were assessed as slightly-to-very eutrophic (0.4%), 31 acres were assessed as mesotrophic (<0.1%), and 9,092 acres were not assessed for trophic state (25.5%). Another 1,500 acres were assessed as argillotrophic (4.3%). Out of the reported wetland acres, trends in trophic status were as follows: 8% were stable over time (2,885 acres), 62% were degrading over time (22,220 acres), and trends in 26% (9,162 acres) were unknown.

Development of Wetland Water Quality Standards

(No new data to report.)

Additional Wetland Protection Activities

The most recent effort to assess and protect wetlands, by KDHE, was the awarding of an EPA State Wetland Protection Grant. This grant allowed the department to undertake a five year assessment effort, at all of the major public wetland areas within the state, in order to develop baseline water quality information. As of this writing, 32 of the wetlands in this report have received multiple surveys concerning functions and values, and 17 (those with available summertime surface water) have received multiple, comprehensive, water quality surveys. The final project report will be available in 2002, and all project data was utilized in this 305b cycle.